Goniometer measurement for upper limb

Shoulder joint

Shoulder Flexion:-

Patient position: Supine with shoulder in 0 degrees flexion, elbow fully extended, forearm in neutral rotation with palm facing trunk (Fie. 3 - 1) .

Stabilization: Over anterosuperior aspect of ipsilateral shoulder, proximal to humeral head (
Fig. 3 - 2) .

Examiner action: After instructing patient in motion desired, flex patient's shoulder through available range of motion (ROM) avoiding extension of spine. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fie. 3 - 2) .

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-1) and align goniometer accordingly (Fig. 3 - 3) .

Stationary arm: Lateral midline of thorax.

Axis: Midpoint of lateral aspect of acromion process.

Moving arm: Lateral midline of humerus toward lateral humeral epicondyle.

Read scale of goniometer.

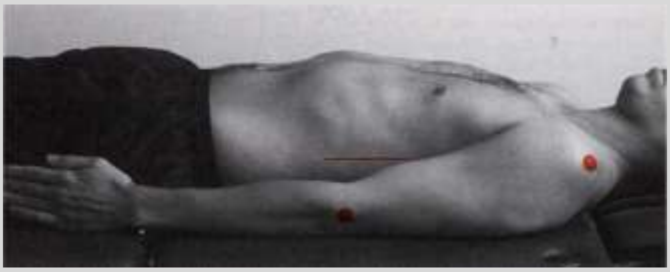

Fig. **3 - 1.** Starting position for measurement of shoulder flexion. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral midline of thorax, lateral humeral epicondyle) indicated by orange line and dots.

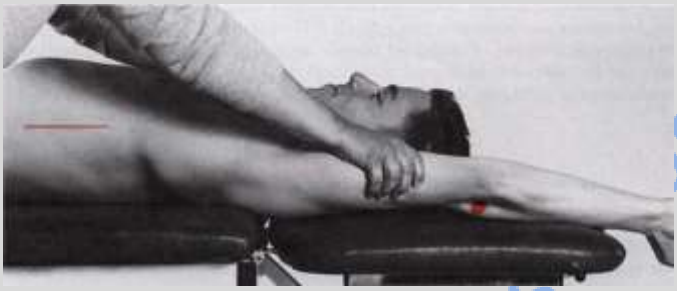

Fig. **3-2.** End of shoulder flexion ROM, showing proper hand placement for stabilizing thorax and flexing shoulder. Bony landmarks for goniometer alignment (lateral midline of thorax, lateral humeral epicondyle) indicated by orange line and dot.

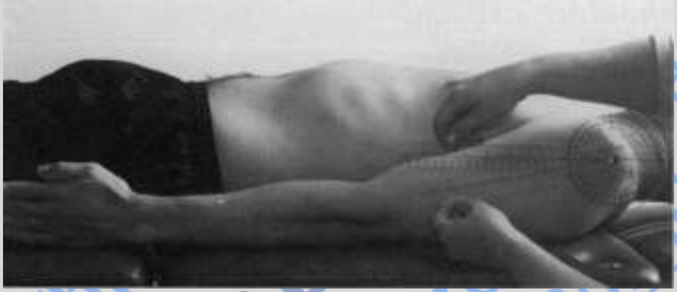

Fig. **3-3.** Starting position for measurement of shoulder flexion, demonstrating proper initial alignment of goniometer.

Patient/Examiner action: Perform passive, or have patient perform active, shoulder flexion (Fig. 3 - 4) .

Confirmation of alignment: Repalpate landmarks and confirm proper goniometric alignment at end of ROM, correcting alignment as necessary (see Note). Read scale of goniometer (Tie. 3 - 4) .

Documentation: Record patient's ROM.

Note: No extension of spine should be allowed during measurement of shoulder flexion, to prevent artificial inflation of ROM measurements.

Alternative patient position: Seated or sidelying, goniometer alignment remains same. Owing to decreased ability to stabilize trunk in these positions, great care must be taken to assure that stationary arm of goniometer remains aligned with lateral midline of thorax and that extension of spine does not occur. Failure to exercise such care will result in errors of measurement.

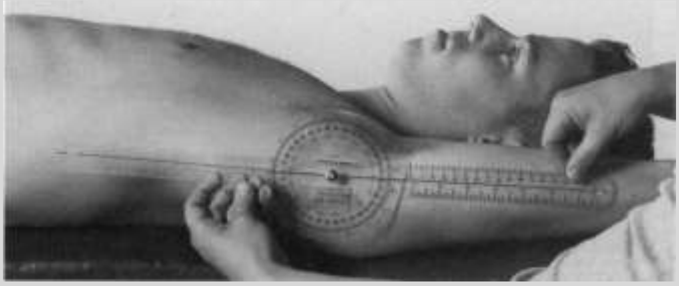

Fig. **3-4.** End of shoulder flexion ROM, demonstrating proper alignment of goniometer at end of range.

Shoulder Extension:-

Patient position: Prone with shoulder in 0 degrees flexion, elbow fully extended, forearm in neutral rotation with palm facing trunk (Fig. 3 - 5) .

Stabilization: Over posterosuperior aspect of ipsilateral shoulder, proximal to humeral head (Fie. 3 - 6) .

Examiner action: After instructing patient in motion desired, extend patient's shoulder through available ROM, avoiding rotation of trunk. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fie. 3 - 6) .

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-5) and align goniometer accordingly (Fig. 3-7).

Stationary arm: Lateral midline of thorax.

Axis: Midpoint of lateral aspect of acromion process.

Moving arm: Lateral midline of humerus toward lateral humeral epicondyle.
Fig. **3-6.** End of shoulder extension ROM, showing proper hand placement for stabilizing thorax and extending shoulder. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral midline of thorax, lateral humeral epicondyle) indicated by orange line and dots.
Read scale of goniometer.

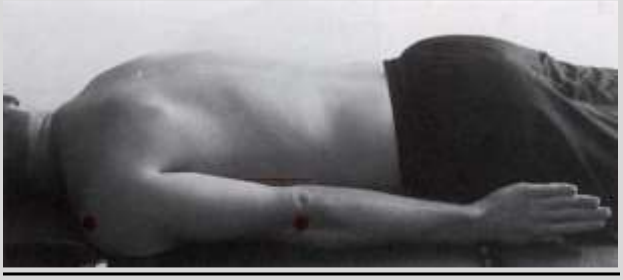

Fig. **3-5.** Starting position for measurement of shoulder extension. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral midline of thorax, lateral humeral epicondyle) indicated by orange line and dots.

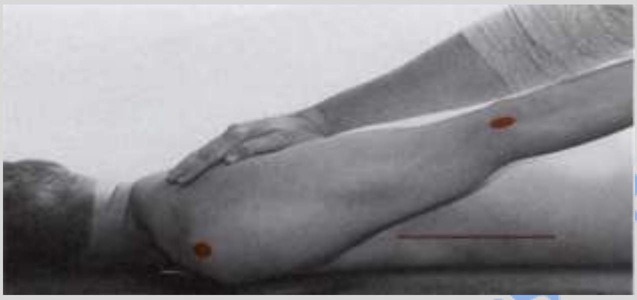

Fig. **3-6.** End of shoulder extension ROM, showing proper hand placement for stabilizing thorax and extending shoulder. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral midline of thorax, lateral humeral epicondyle) indicated by orange line and dots.

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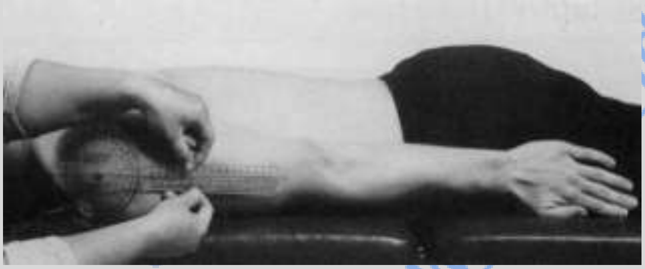

Fig. **3-7.** Starting position for measurement of shoulder extension, demonstrating proper initial alignment of goniometer.

Patient/Examiner action: Perform passive, or have patient perform active, shoulder extension (Fig. 3-8).

Confirmation of Repalpate landmarks and confirm proper goniometric alignment at end of

alignment: ROM, correcting alignment as necessary (see Note). Read scale of goniometer (Fig. 3 - 8) .

Documentation: Record patient's ROM.

Note: No rotation of spine should be allowed during measurement of shoulder extension, to prevent artificial inflation of ROM measurements.

Alternative patient position: Seated or side lying; goniometer alignment remains same. Owing to decreased ability to stabilize trunk in these positions, great care must be taken to assure that stationary arm of goniometer remains aligned with lateral midline of thorax and that flexion of spine does not occur. Failure to exercise such care will result in errors of measurement.

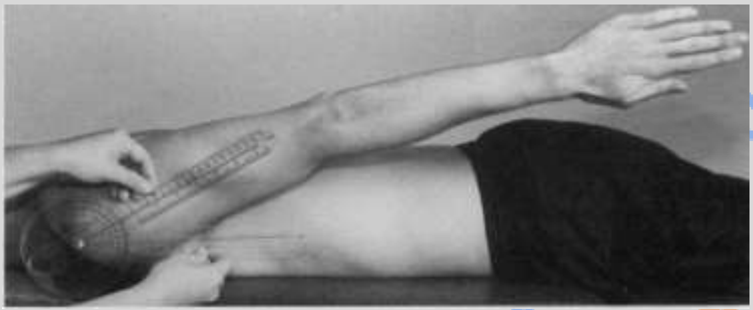

Fig. **3-8.** End of shoulder extension ROM, demonstrating proper alignment of goniometer at end of range.

Patient position: Supine with arm at side, upper extremity in anatomical position (Fig. 3-9).

Stabilization: Over superior aspect of ipsilateral shoulder, proximal to humeral head (Fig. 3-10).

Examiner action: After instructing patient in motion desired, abduct patient's shoulder through available ROM, avoiding lateral trunk flexion. Return limb to starting position. Performing passive movement provides an estimate of the ROM and demonstrates to patient exact motion desired (see Fig. 3-10).

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-9) and align goniometer accordingly (Fig. 3-11).

Stationary arm: Parallel to sternum.

Axis: Anterior aspect of acromion process.

Moving arm: Anterior midline of humerus toward medial humeral epicondyle.

Patient/Examiner action: Perform passive, or have patient perform active, shoulder abduction (Fig. 3-12).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometric alignment at end of ROM, correcting alignment as necessary (see Note). Read scale of goniometer (Fie. 3-12).

Documentation: Record patient's ROM.

Note: No lateral flexion of spine should be allowed during measurement of shoulder abduction to prevent artificial inflation of ROM measurements.

Alternative patient position: Seated; goniometer is aligned as follows: Stationary arm parallel to spinous process of vertebral column, axis with posterior aspect of acromion, and moving arm along posterior midline of humerus toward lateral humeral epicondyle.

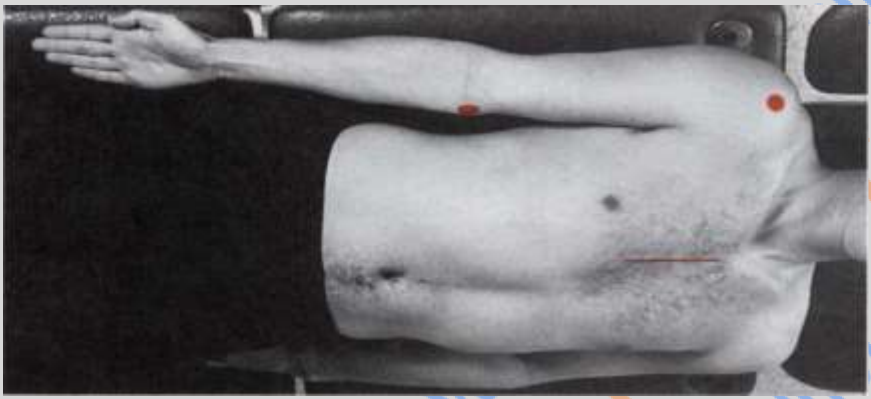

Fig. 3-9. Starting position for measurement of shoulder abduction with patient in the supine position. Bony landmarks for goniometer alignment (anterior aspect of acromion process, midline of sternum, medial humeral epicondyle) indicated by orange line and dots.

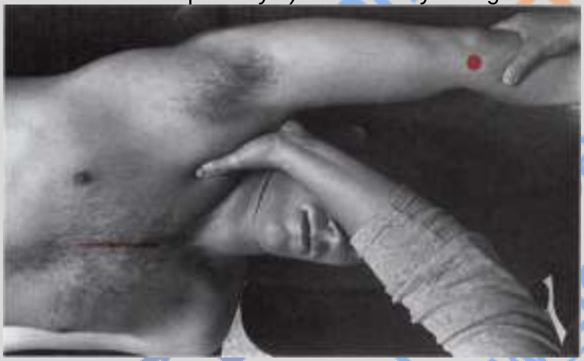

Fig. **3-10.** End of shoulder abduction ROM, showing proper hand placement for stabilizing thorax and abducting shoulder. Bony landmarks for goniometer alignment (midline of sternum, medial humeral epicondyle) indicated by orange line and dot.

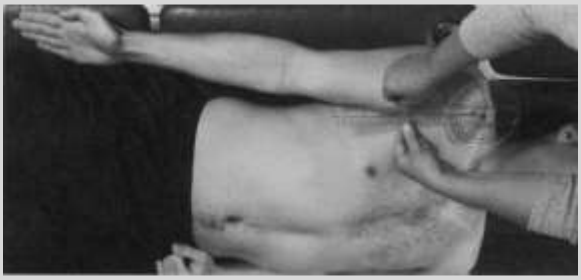

Fig. **3 - 1 1 .** Starting position for measurement of shoulder abduction, demonstrating proper initial alignment of goniometer.

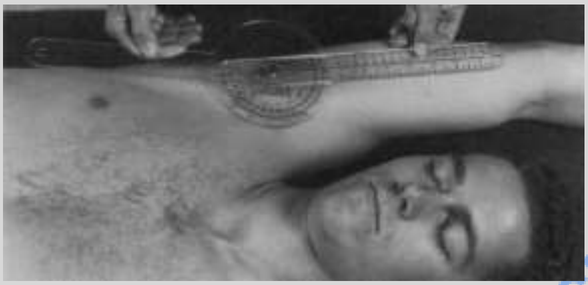

Fig. **3-12.** End of shoulder abduction ROM, demonstrating proper alignment of goniometer at end of range.

Shoulder Adduction:-

Patient position: Supine with arm at side, upper extremity in anatomical position (Fig. 3-13).

Stabilization: Over superior aspect of ipsilateral shoulder, proximal to humeral head (Fig. 3-14).

Examiner action: After instructing patient in motion desired, adduct patient's shoulder through available ROM, avoiding lateral trunk flexion. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig. 3-14).

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-17) and align goniometer accordingly (Fig. 3-19).

Stationary arm: Perpendicular to floor.

Axis: Olecranon process of ulna.

Moving arm: Ulnar border of forearm toward ulnar styloid process.

Patient/Examiner action: Perform passive, or have patient perform active, lateral rotation of the shoulder, stopping at the point of elevation of the scapula off the table (Fig. 3-20).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometer alignment at end of ROM, correcting alignment as necessary. Read scale of goniometer (Fig. 3-20).

Documentation: Record patient's ROM.

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Alternative patient position: Prone; goniometer alignment remains same. Measurement also may be taken with shoulder positioned in less abduction. If such positioning is used, amount of abduction of shoulder must be documented.

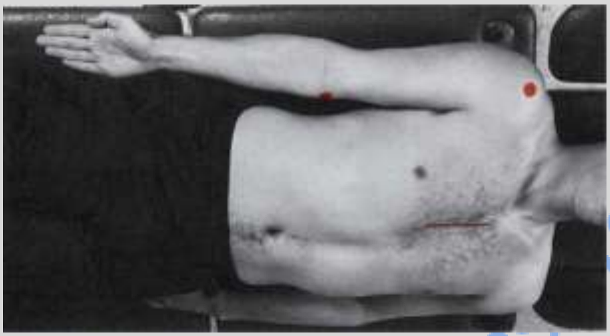

Fig. 3-13. Starting position for measurement of shoulder adduction with patient in the supine position. Bony landmarks for goniometer alignment (anterior aspect of acromion process, midline of sternum, medial humeral epicondyle) indicated by orange line and dots.

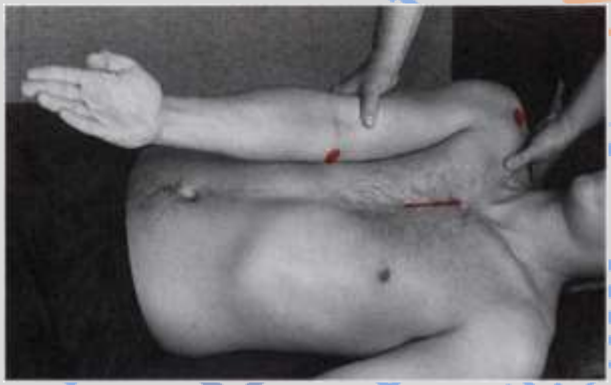

Fig. **3-14.** End of shoulder adduction ROM, showing proper hand placement for stabilizing thorax and adducting shoulder. Bony landmarks for goniometer alignment (anterior aspect of acromion process, midline of sternum, medial humeral epicondyle) indicated by orange line and dots.

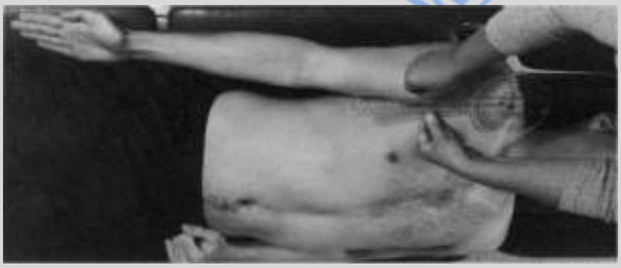

Fig. 3-15. Starting position for measurement of shoulder adduction, demonstrating proper initial alignment of goniometer.

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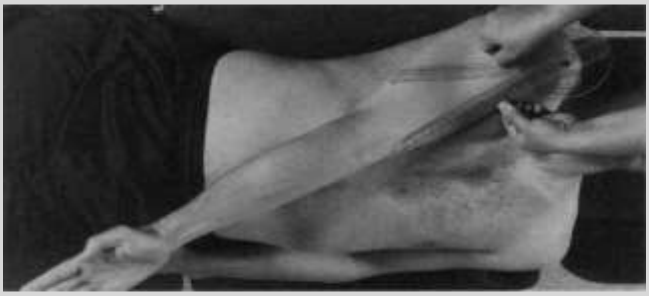

Fig. 3-16. End of shoulder adduction ROM, demonstrating proper alignment of goniometer at end of range.

Shoulder Lateral Rotation:-

Patient position: Supine with shoulder abducted to 90 degrees, elbow flexed to 90 degrees, forearm pronated, folded towel under humerus (Fig. 3-17).

Stabilization: Place heel of hand over superior aspect of ipsilateral shoulder, proximal to humeral head; fingers over ipsilateral scapula (Fig. 3-18).

Examiner action: After instructing patient in motion desired, laterally rotate patient's shoulder through available ROM, making sure the scapula does not lift off the table. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig. 3-18).

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-17) and align goniometer accordingly (Fig. 3-19).

Stationary arm: Perpendicular to floor.

Axis: Olecranon process of ulna.

Moving arm: Ulnar border of forearm toward ulnar styloid process.

Patient/Examiner action: Perform passive, or have patient perform active, lateral rotation of the shoulder, stopping at the point of elevation of the scapula off the table (Fig. 3-20).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometer alignment at end of ROM, correcting alignment as necessary. Read scale of goniometer (Fig. 3-20).

Documentation: Record patient's ROM.

Alternative patient position: Prone; goniometer alignment remains same. Measurement also may be taken with shoulder positioned in less abduction. If such positioning is used, amount of abduction of shoulder must be documented.

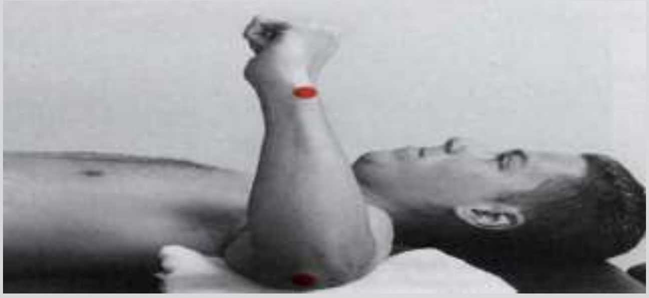

Fig. 3-17. Starting position for measurement of shoulder lateral rotation. Landmarks for goniometer alignment (olecranon and styloid processes of ulna) indicated by orange dots.

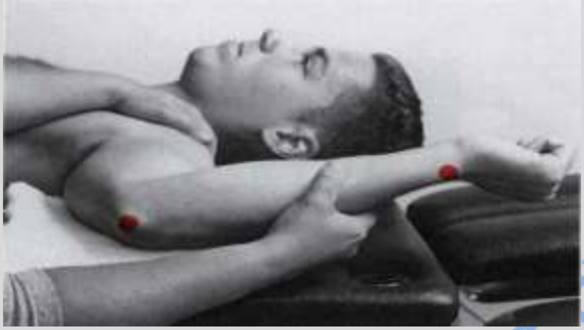

Fig. 3-18. End of shoulder lateral rotation ROM, showing proper hand placement for stabilizing thorax and laterally rotating shoulder. Landmarks for goniometer alignment (olecranon and styloid processes of ulna) indicated by orange dots. Fig. 3-17. Starting position for measurement of shoulder lateral rotation. Landmarks for goniometer alignment (olecranon and styloid processes of ulna) indicated by orange dots.

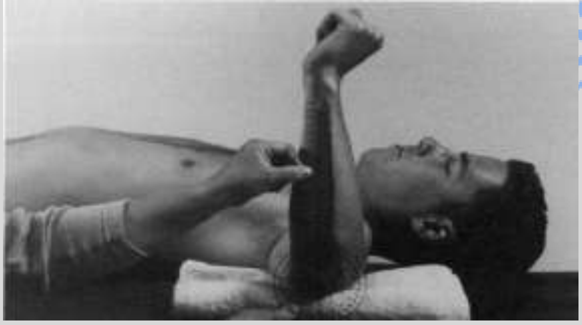

Fig. 3-19. Starting position for measurement of shoulder lateral rotation, demonstrating proper initial alignment of goniometer.

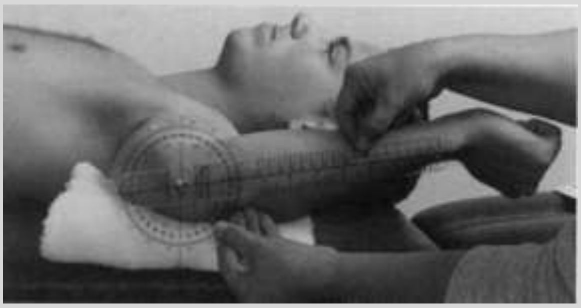

Fig. 3-20. End of shoulder lateral rotation ROM, demonstrating proper alignment of goniometer at end of range.

Shoulder Medial Rotation:-

Patient position: Supine with shoulder abducted to 90 degrees, elbow flexed to 90 degrees, forearm pronated, folded towel under humerus (Fig. 3-21).

Stabilization: Place heel of hand over superior aspect of ipsilateral shoulder, proximal to humeral head, and fingers over ipsilateral scapula (Fig. 3-22).

Examiner action: After instructing patient in motion desired, medially rotate patient's shoulder through available ROM, making sure the scapula does not lift off the table. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig 3-22).

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 3-21) and align goniometer accordingly (Fig. 3-23).

Stationary arm: Perpendicular to floor.

Axis: Olecranon process of ulna.

Moving arm: Ulnar border of forearm toward ulnar styloid process.

Patient/Examiner action: Perform passive, or have patient perform active, medial rotation of the shoulder, stopping at the point of elevation of the scapula off the table (Fig. 3-24).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometer alignment at end of ROM, correcting alignment as necessary. Read scale of goniometer (Fig. 3-24).

Documentation: Record patient's ROM.

Alternative patient position: Prone; goniometer alignment remains same. Measurement also may be taken with shoulder positioned in less abduction. If such positioning is used, amount of abduction of shoulder must be documented.

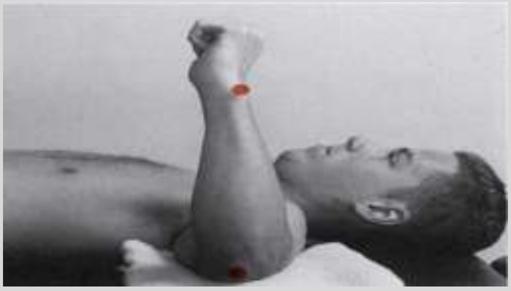

Fig. 3 - 2 1 . Starting position for measurement of shoulder medial rotation. Landmarks for goniometer alignment (olecranon and styloid processes of ulna) indicated by orange dots.

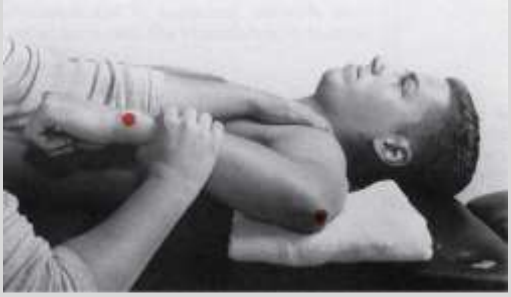

Fig. 3-22. End of shoulder medial rotation ROM, showing proper hand placement for stabilizing thorax and medially rotating shoulder. Landmarks for goniometer alignment (olecranon and styloid processes of ulna) indicated by orange dots.

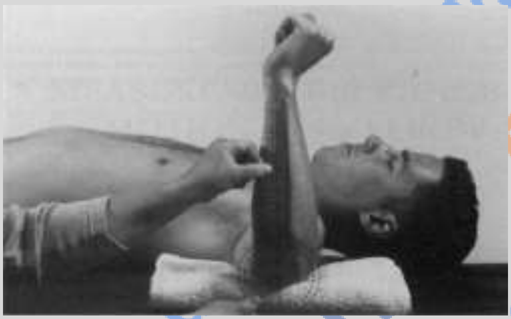

Fig. 3-23. Starting position for measurement of shoulder medial rotation, demonstrating proper initial alignment of goniometer.

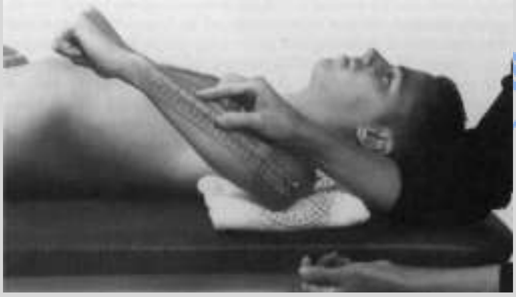

Fig. 3-24. End of shoulder medial rotation ROM, demonstrating proper alignment of goniometer at end of range.

Elbow joint

Elbow Flexion:-

Patient position: Supine with upper extremity in anatomical position (see Note), folded towel under humerus, proximal to humeral condyles (Fig. 4 - 1) .

Stabilization: Over posterior aspect of proximal humerus (Fig. 4 - 2) .

Examiner action: After instructing patient in motion desired, flex patient's elbow through available ROM. Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig. 4 - 2) .

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 4-1) and align goniometer accordingly (Fig. 4 - 3) .

Stationary arm: Lateral midline of humerus toward acromion process.

Axis: Lateral epicondyle of humerus.

Moving arm: Lateral midline of radius toward radial styloid process (see Note). Read scale of goniometer.

Patient/Examiner action: Perform passive, or have patient perform active, elbow flexion (Fig. 4 - 4) .

Confirmation of alignment: Repalpate landmarks and confirm proper goniometric alignment at end of ROM, correcting alignment as necessary. Read scale of goniometer (Fig. 4^1).

Documentation: Record patient's ROM.

Note: Patient's forearm should be completely supinated at beginning of ROM, or beginning reading of goniometer will be inaccurate and make patient appear to lack full elbow extension.

Alternative patient position: Seated or sidelying: towel not needed; goniometer alignment remains same. Stability of humerus decreased in these positions; thus, extra care must be taken to manually stabilize humerus.

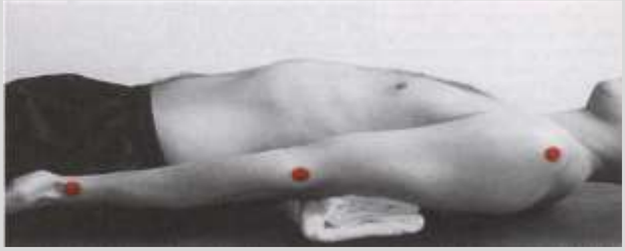

Fig. 4 - 1 . Starting position for measurement of elbow flexion. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral humeral epicondyle, radial styloid process) indicated by orange dots.

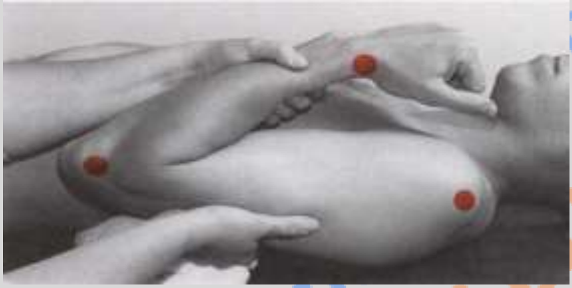

Fig. 4 - 2 . End of elbow flexion ROM, showing proper hand placement for stabilizing humerus and flexing elbow. Bony land marks for goniometer alignment (lateral aspect of acromion process, lateral humeral epicondyle, radial styloid process) indicated by orange dots.

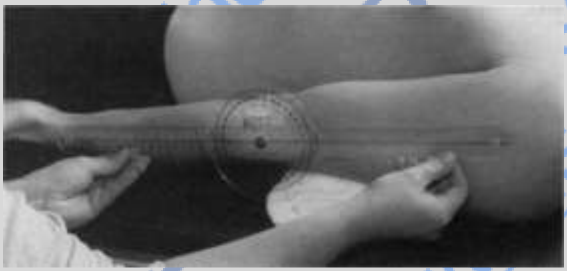

Fig. 4-3. Starting position for measurement of elbow flexion, demonstrating proper initial alignment of goniometer.

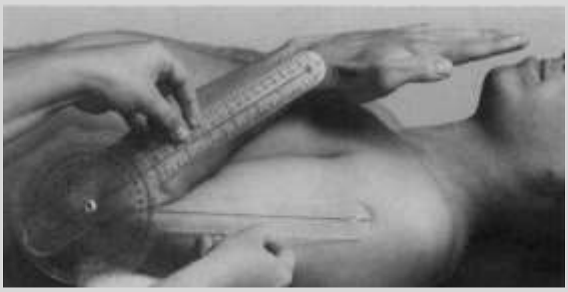

Fig. 4-4. End of elbow flexion ROM, demonstrating proper alignment of goniometer at end of range.

Elbow Extension:-

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Patient position: Supine with upper extremity in anatomical position (see Note), elbow extended as far as possible, folded towel under distal humerus, proximal to humeral condyles (Fig. 4 - 5) .

Stabilization: None needed.

Examiner action: Determine if elbow is extended as far as possible by either: a) asking patient to straighten elbow as far as possible (if measuring active ROM); or, b) providing pressure across the elbow in the direction of extension (if measuring passive ROM) (Fig. 4 - 6) .

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 4-5) and align goniometer accordingly (Fig. 4-7).

Stationary arm: **Axis:** Lateral midline of humerus toward acromion process. Lateral epicondyle of humerus.

Moving arm: Lateral midline of radius toward radial styloid process (see Note). Read scale of goniometer (Fig. 4-7).
Documentation: Record patient's amount of elbow extension.

Note: Patient's forearm should be completely supinated at beginning of ROM, or beginning reading of goniometer will be inaccurate and make patient appear to lack full elbow extension.

Alternative patient position: Seated or sidelying; towel not needed; goniometer alignment remains same.

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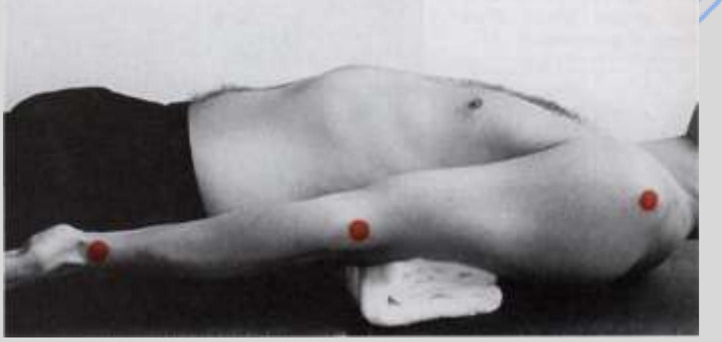

Fig. **4-5.** Starting position for measurement of elbow extension. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral humeral epicondyle, radial styloid process) indicated by orange dots.

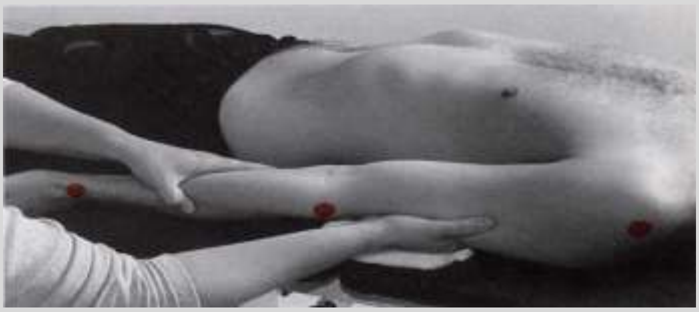

Fig. **4-6.** End of elbow extension ROM, showing proper hand placement for stabilizing humerus and extending elbow. Bony landmarks for goniometer alignment (lateral aspect of acromion process, lateral humeral epicondyle, radial styloid process) indicated by orange dots.

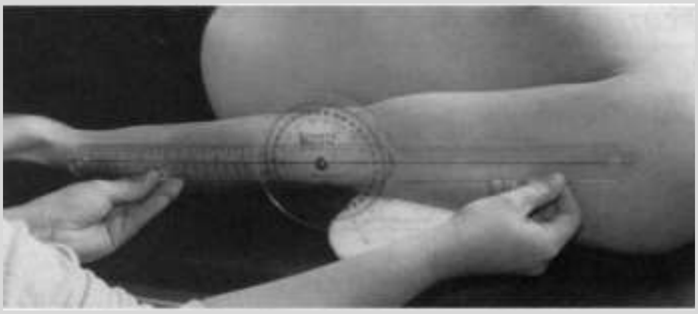

Fig. **4-7.** Goniometer alignment for measurement of elbow extension.

Superior and Inferior radio-ulnar joint

Forearm Supination:-

Patient position: Seated or standing with shoulder completely adducted, elbow flexed to 90 degrees, forearm in neutral rotation (Fig. 4 - 8) .

Stabilization: Over lateral aspect of distal humerus, maintaining 0 degrees shoulder adduction
(Fig. 4 - 9) .

Examiner action: After instructing patient in motion desired, supinate patient's forearm through available ROM, avoiding lateral rotation of shoulder or shoulder adduction past 0 degrees (see Note). Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig. 4-9).

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 4-8) and align goniometer accordingly (Fig. 4-10).

Stationary arm: Parallel with anterior midline of humerus.

Axis: On volar surface of wrist, in line with styloid process of ulna.

Moving arm: Volar surface of wrist, at level of ulnar styloid process.
Read scale of goniometer.

Patient/Examiner action: Perform passive supination, or have patient perform active forearm supination (Fig. 4-11).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometric alignment at end of ROM, correcting alignment as necessary (see Note). Read scale of goniometer (Fig. 4-11).

Documentation: Record patient's ROM.

Note: No adduction or lateral rotation of shoulder should be allowed during measurement of forearm supination, to prevent artificial inflation of ROM measurements.

* Alignment of goniometer's axis opposite ulnar styloid process is possible at start of measurement of forearm supination (see Fig. 4-10). By end of supination ROM, axis of goniometer will have moved to a position superior and medial to ulnar styloid (see Fig. 4-11). Alignment of arms, and not axis, of goniometer is most critical element in this measurement.

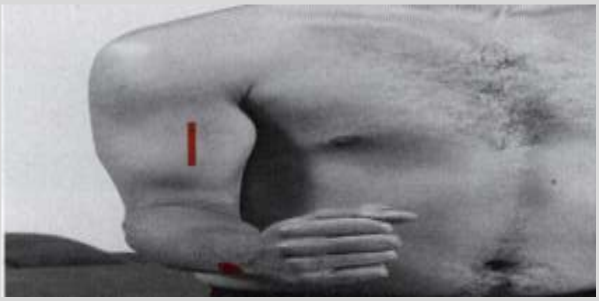

Fig. 4-8. Starting position for measurement of forearm supination. Bony landmarks for goniometer alignment (anterior midline of humerus and ulnar styloid process) indicated by orange line and dot.

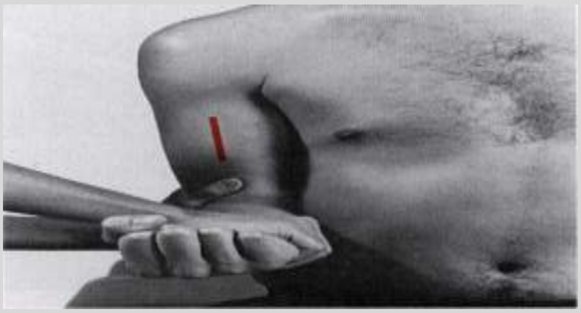

Fig. 4-9. End of forearm supination ROM, showing proper hand placement for stabilizing humerus against thorax and supinating forearm. Bony landmark for goniometer alignment (anterior midline of humerus) indicated by orange line.

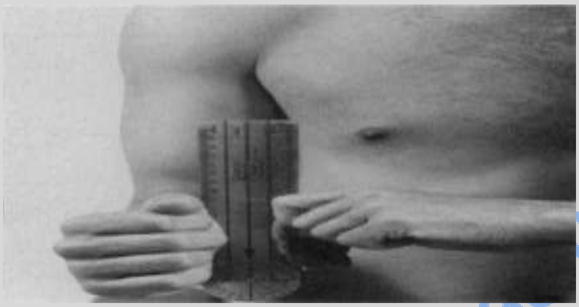

Fig. 4-10. Starting position for measurement of forearm supination, demonstrating proper initial alignment of goniometer.

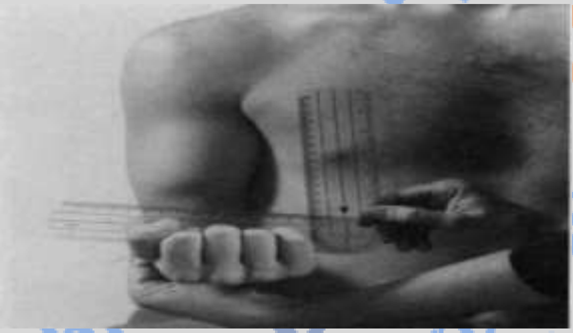

Fig. 4 - 1 1 . End of forearm supination ROM, demonstrating proper alignment of goniometer at end of range.

Forearm Pronation:-

Patient position: Seated or standing with shoulder completely adducted, elbow flexed to 90 degrees, forearm in neutral rotation (Fig. 4 - 1 2) .

Stabilization: Over lateral aspect of distal humerus, maintaining shoulder adduction (Fig. 4-13).

Examiner action: After instructing patient in motion desired, pronate patient's forearm through available ROM, avoiding shoulder abduction and medial rotation (see Note). Return limb to starting position. Performing passive movement provides an estimate of ROM and demonstrates to patient exact motion desired (see Fig. 4 - 1 3) .

Goniometer alignment: Palpate the following bony landmarks (shown in Fig. 4-12) and align goniometer accordingly (Fig. 4-14).

Stationary arm: Parallel with anterior midline of humerus.

Axis: In line with, and just proximal to, styloid process of ulna.

Moving arm: Dorsum of forearm, just proximal to ulnar styloid process.

Patient/Examiner action: Perform passive forearm pronation, or have patient perform active forearm pronation (Fig. 4-15).

Confirmation of alignment: Repalpate landmarks and confirm proper goniometric alignment at end of ROM, correcting alignment as necessary (see Note). Read scale of goniometer (Fig. 4-15).

Documentation: Record patient's ROM.

Note: No abduction or medial rotation of shoulder should be allowed during measurement of forearm pronation, to prevent artificial inflation of ROM measurements.

* Alignmen of goniometer's axis with ulnar styloid process is possible at start of measurement of forearm pronation (see Fig. 4 - 1 4) . By end of pronation ROM, axis of goniometer will have moved to a position superior and lateral to ulnar styloid (see Fig. 4 - 1 5) . Alignment of arms, and not axis, of goniometer is most critical element in this measurement.

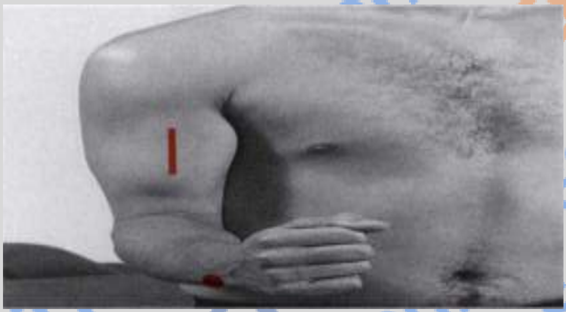

Fig. 4-12. Starting position for measurement of forearm pronation. Bony landmarks for goniometer alignment (anterior midline of humerus and ulnar styloid process) indicated by orange line and dot.

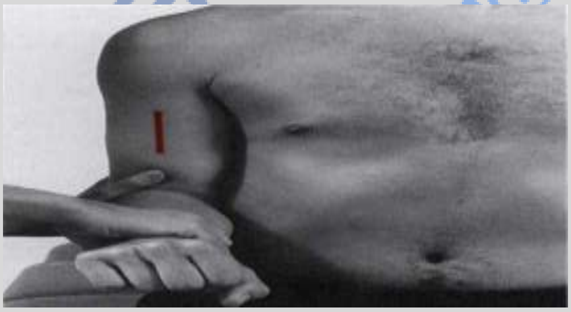

Fig. 4-13. End of forearm pronation ROM, showing proper hand placement for stabilizing humerus against thorax and pronating forearm. Bony landmark for goniometer alignment (anterior midline of humerus) indicated by orange line.

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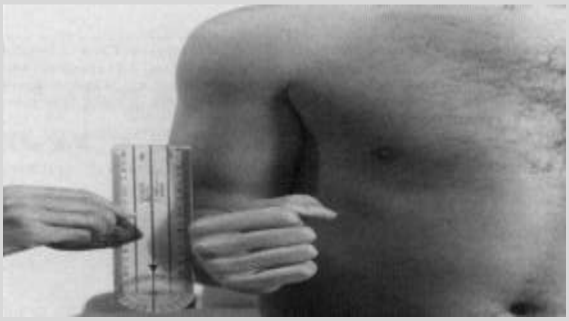

Fig. 4-14. Starting position for measurement of forearm pronation, demonstrating proper initial alignment of goniometer.

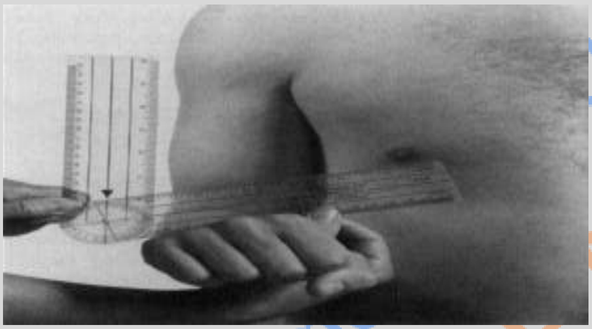

Fig. 4-15. End of forearm pronation ROM, demonstrating proper alignment of goniometer at end of range.